SOME PROPERTIES OF Re_2Te_5-BASED MATERIALS

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We have recently started to investigate the potential of Re_2Te_5-based materials for thermoelectric applications. Re_2Te_5 is a semiconducting compound with an estimated energy band gap of 0.8 eV. It has a relatively complex crystal structure with 84 atoms per unit cell. Initial results obtained on p-type polycrystalline samples showed that they possess large Seebeck coefficient values but large electrical resistivity values. They also exhibit very low thermal conductivity with a room temperature value of 10 mW/cmK. Another attracting feature of Re_2Te_5 is the possibility to insert a variety of atoms in the large voids (2.8 Å in diameter) of the crystal structure to form $Re_6M_2Te_{15}$ filled compositions. The void fillers could act as phonon scattering centers, further reducing the thermal conductivity in these materials. We are currently exploring the synthesis and properties of filled compositions (with Ag, Fe, ...) as well as n-type Re_2Te_5 samples doped with Ag or Fe. We present and discuss recent results which confirm that Re_2Te_5-based compositions are promising thermoelectric materials.

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